Statistical Sampling for Sales and Use Tax Audits

Statistical Sampling for Sales and Use Tax Audits

Table of Contents

Tennessee Department of Revenue
Audit Division

Statistical Sampling for Sales and Use Tax Audits

Part 1. Introduction

The Tennessee Department of Revenue uses statistical sampling methods in sales and use tax audits where examination of 100% of the taxpayer's records is not feasible. This manual is an introduction to the application of statistical sampling theory and methodology to sales and use tax audits performed by the Tennessee Department of Revenue. The manual is designed to serve as:

1. The participant's manual for the Tennessee Department of Revenue's Statistical Sampling for Sales and Use Tax Audits course.
2. The procedures guide to be followed by auditors in using statistical sampling methods in sales and use tax audits.
3. The documentation of the Department's statistical sampling procedures for distribution to taxpayers, tax practitioners, tax attorneys, and other parties interested in understanding the Department of Revenue's statistical sampling program.

There is no confidential information contained in this manual. The statistical sampling procedures discussed in the manual apply to both sales and use tax audits. For the purposes of simplicity, we will discuss statistical sampling in the context of a use tax audit.   We will discuss, however, any areas where there are substantial differences in the audit procedures between a use tax audit and a sales tax audit.

On completing the course, participants will be able to:

- Identify good candidates for a statistical sample.
- Explain to taxpayers the benefits of a statistical sample.
- Explain to taxpayers the basic electronic data processing terms used in the statistical sampling program.
- Verify the completeness and accuracy of the electronic data received from the taxpayer.
- Define the audit population for a statistical sample.
- Explain to taxpayers how and why we stratify populations.
- Explain to taxpayers how we draw a random sample from a population.
- Explain to taxpayers the procedure for auditing positive and negative invoice amounts.
- Explain in detail the results of a statistical sample to taxpayers.
- Identify current statistical sampling issues and court decisions.

Statistical Sampling for Sales and Use Tax Audits

The following software programs will be demonstrated in the class:

- Audit Command Language (ACL)
- The Tax Stratification and Estimation Program (TSEP). A technical documentation of the methodology used by the Tax Estimation and Stratification Program (TSEP) is provided in Appendix 8 to this document. This documentation was prepared by Dr. Richard W. Kulp, the author of TSEP.

A case study based on an actual use tax statistical sample will be used throughout the manual.

Statistical Sampling for Sales and Use Tax Audits

Part 2. Starting a Statistical Sample

Objectives

On completing this part of the course, participants will be able to:

- Identify good candidates for a statistical sample.
- Explain to taxpayers the benefits of a statistical sample.
- Complete a Statistical Sampling Request Form.

Identifying Good Candidates for a Statistical Sample

A good candidate for a statistical sample should have:

- Large volume of records. Sampling has long been accepted as a valid audit technique in situations where the volume of taxpayer records are too large for a 100 percent examination. Traditionally, sales and use tax auditors have used a block or test-period method of sampling.
- Complete records. Statistical sampling requires complete records for the audit period.
- Electronic data. Because of the need to have an accurate count of the total number of invoices in the population and the need to stratify the data on the invoice amount in order to improve on sampling efficiency, statistical sampling requires access to electronic data.
- Good internal controls. It is important that the auditor verifies that the taxpayer has good internal controls. At the minimum, good internal controls require that the taxpayer is consistent in making determinations about the taxability of transactions.

The Benefits of a Statistical Sample

The benefits to the taxpayer of a statistical sample include the following:

- Statistical sampling is the most accurate method of sampling. Other sampling methods should be used only when a statistical sample is not feasible.
- The process of selecting records for examination is objective. The records in a statistical sample are selected randomly, thus ensuring complete objectivity in their selection.
- Statistical sampling is more efficient than other sampling methods. Especially in the case where the taxpayer has a very large volume of records, statistical samples will typically require the auditor to look at fewer records than samples using other methodologies.
- Statistical samples are reliable. Used consistently over time, statistical sampling will yield reliable results.

Statistical Sampling for Sales and Use Tax Audits

- The sample is representative of the population of records. Because statistical sampling is based on the random selection of records from the entire population of records and because each record (or each invoice in a stratum) has an equal probability of being selected, a statistical sample is representative of the entire population of records. In a block or test-period sample, on the other hand, only the records in the block or test period are subject to selection. Since there is no way to determine if the block or test period is accurately representative of the population, a block or test-period sample may not be representative of the population of records.

- Both debits and credits are sampled. The taxpayer should be encouraged to participate in the selection of accounts to be included in the population. This provides the taxpayer with the opportunity to include records in the population in which the possibility of the overpayment of tax exists.

- The Division will project credits based on the results of a statistical sample. Because both debits and credits are sampled, some statistical samples result in credits. Projecting a credit to a taxpayer on the result of a statistical sample is a measure of the Audit Division's confidence in this methodology.

- If the sample results in an assessment, the taxpayer can be 75% confident that the true liability is greater than the amount being assessed. The total population assessment has a 50% chance of being too high and a 50% chance of being too low. Consequently, we are only 50% confident that the taxpayer owes as much as the total population assessment. We use a statistical method to reduce the assessment to an amount which enables us to be 75% confident that the amount actually assessed is not too high.

Completing a Computer-Assisted Audit Request Form

The auditor should complete a Statistical Sampling Request Form as soon as the taxpayer has agreed to a statistical sample. A copy of the Statistical Sampling Request Form is included in Appendix 1. An electronic copy is saved on the Department's LAN under the name of Statistical Sample Request.doc in the M:\DATA\COMMON\STATISTICS directory.

Case Study

The taxpayer used in the case study is a food, supplies, and restaurant equipment supplier. The auditor proposed doing a statistical sample of the taxpayer's expenses.

Statistical Sampling for Sales and Use Tax Audits

Part 3. Basic Data Processing Terms

Objectives

On completing this part of the course, participants will be able to:

- Explain to taxpayers the basic electronic data processing terms used in the statistical sampling program.
- Define an acceptable medium for transferring electronic data.
- Explain to taxpayers the Electronic Data Record Layout Form.

The data processing concepts and terms discussed in this section are applicable to any electronic data interchange (EDI) audit which involves directly accessing the taxpayer's electronic records.

Data Requirements

The specific records and data fields needed to audit a taxpayer will vary according to the tax and the specific circumstances of the taxpayer. It is important to ensure that the data file provided by a taxpayer has sufficient detail to enable the auditors to identify and retrieve individual transactions. Additional information, such as item descriptions and tax paid or accrued, is useful for the auditor in making tax determinations directly from the electronic data. This can be a tremendous time saver for both the taxpayer and auditor. Appendix 13 is a list of many of the data fields used in electronic audits and the definition of each.

The table below lists the data fields that are used in most sales tax statistical samples and which fields are required.

Sales File	
Field Description	**Required Field**
Customer Name/Customer Code	Yes
Customer Zip Code or State	Yes
Invoice Date	Yes
Invoice Number	Yes
Invoice Amount	Yes
Ship to Zip Code or State	Yes
Tax Amount	No
Tax Exempt Certificate Number	No

Statistical Sampling for Sales and Use Tax Audits

The table below lists the data fields that are used in most use tax statistical samples and which fields are required.

Expense File	
Field Description	**Required Field**
Vendor Name/Vendor Code	Yes
Invoice/Transaction Date	Yes
Invoice/Transaction Number	Yes
Invoice/Transaction Amount	Yes
Account Number	Yes
GL Date/System Date	No
Item Number/Product Number	No
Item Description	No
PO Number	No
Voucher Number	No
Net Invoice Amount	No
Shipping Amount	No
Tax Amount	No
Tax Accrual Information	No
Location Code	No

Data Medium

Data can be stored on a variety of data media. These include the following:

- 3420 Reel at 1600 bpi
- 3480 Cartridge
- Diskette
- 100 mg Zip Disk
- Internet e-mail
- 4mm tape

- 3420 Reel at 6250 bpi
- 3490 Cartridge
- CD
- Jaz Disk
- 8mm tape
- ¼ tape

Electronic Data Record Layout

We request that the taxpayer submit the electronic data to us in a fixed width **flat file** format. In a flat file, each line of data is called a **record**. Each record contains one or more **fields** of data. A record might be an invoice; the fields might include invoice number, invoice date, vendor name, account number, and invoice amount.

Statistical Sampling for Sales and Use Tax Audits

In order to be able to read the data from a flat file, we need to have a record layout. On the record layout, the taxpayer indicates what fields are included in the data, the start and end position for each field, the field length, the field name, the field description and the type of data for each field (e.g., alpha, numeric, date, etc.). A copy of the Electronic Data Record Layout form for the case study is included in Appendix 2 to this document. . An electronic copy is saved on the Department's LAN under the name of LAYOUT.DOC in the M:\DATA\COMMON\STATISTICS directory.

Data can be formatted several different ways. If the data is from the taxpayer's mainframe computer, the data is stored in an EBCDIC format. Data from personal computers is stored in an ASCII format. If we receive the data in an EBCDIC format, we convert it to an ASCII format. Data can also be character, numeric, or dates. Vendor name is an example of character data. Numeric data such as invoice amount can be stored in a number of different formats as well. Dates are often stored in a date format.

Case Study

The records provided by the taxpayer had the following fields:

Name	Start Position	End Position	Field Length	Field Type	Format
Vendor No.	1	5	5	Alpha	
Vendor Name	6	27	22	Alpha	
Invoice No	28	48	21	Alpha	
Invoice Date	49	54	6	Date	MMDDYY
Account No	55	60	6	Alpha	
Invoice Amount	61	69	9	Numeric	9.2
Check No	70	75	6	Alpha	

Below are five records from the data supplied us by the taxpayer (vendor names have been changed to protect the confidentiality of the data):

```
44405THE PICKLE CO.          140231                120301079000    9000045514
44405THE PICKLE CO.          141421                011402079000    6600047873
44405THE PICKLE CO.          143617                032402079000    6600047873
44405THE PICKLE CO.          144242                041202079000   13200047873
22633FROM THE HEART FOODS I1074/ PALLETS           042602079000   10500046850
```

The Electronic Data Record Layout form for this taxpayer is included in Appendix 2 to this document. The instructor will demonstrate how the information in the Electronic Data Record Layout form is used to define the data fields in ACL. You might note that in the example provided, the taxpayer did not put a decimal place in the invoice amount field. This will be stipulated when the data is read into ACL.

Statistical Sampling for Sales and Use Tax Audits

Part 4. Stratifying the Population and Pulling the Sample

Objectives

On completing this part of the course, participants will be able to:

- Verify the completeness and accuracy of the electronic data received from the taxpayer.
- Define the audit population for a statistical sample.
- Explain to taxpayers how and why we stratify populations.
- Explain to taxpayers how we draw a random sample from a population.

Verifying the Electronic Data

Once we have successfully read the electronic data provided by the taxpayer, we must verify that the data received from the taxpayer is correct and complete by reconciling the electronic data with the taxpayer's books and records. We do this by using ACL to run totals for selected accounts in the data for a given time period such as a year. The auditor then compares these totals with the totals from the taxpayer's books and records.

The taxpayer's books and records include detail General Ledger transactions, Trial Balance and Financial Statements. If the taxpayer prepares financials for Tennessee, then you will definitely want to get those for extensive examination, verification and reconciliation. The auditor must be reassured that the data included in the Tennessee Profit and Loss statement is always correct and that there were no omissions. When the taxpayer is an international company, the federal returns will perhaps be helpful. Another good idea is to see if the taxpayer has filed any F&E returns, this should be another good source of verification.

By comparison, reviewing the books and records of a domestic entity should be relatively easy, because the data is usually readily available. However, the books and records of a foreign or international entity will require more research. On the other hand, whether the entity is domestic or foreign, the auditor should always have full access to all the taxpayers' books and records. The auditor should be able to examine these items and determine transactions that are Tennessee's and those that are not. There are instances when the taxpayer forgot to accurately code a Tennessee transaction. By testing the data, the auditor will be able to identify these errors.

While we do not expect the amounts to match perfectly due to timing issues, manual adjustments to accounts, etc., we would expect the amounts to match reasonably close. It is the auditor's responsibility to make the determination as to whether the data is correct and complete.

Statistical Sampling for Sales and Use Tax Audits

Defining the Audit Population

The audit population is the total set of transactions from which the sample is to be drawn. The auditor must examine all transaction types. These transaction types include AP Invoices, Journal Entries, Accruals, Reversals, and Adjusting Entries. The auditor should never give the taxpayer the impression that they are only interested Expense or Accounts Payable transactions. When requests are made to the taxpayer for their data, the auditor must make it clear that they need all data in order to balance to the books and records. There should be no limit as to the amount of data or transactions examined.

One of the first and most important decisions an auditor must make in a statistical sample audit is to determine which transactions should be included in the audit population and which invoices should be excluded. For example, it is not unusual for the taxpayer to provide us with an electronic copy of the entire accounts payable file. Many of the accounts will have no use tax implications. Examination of invoices from these accounts would be a waste of time for both the auditor who must examine the invoice and the taxpayer who may have to pull the invoice. Therefore, we encourage the auditor to eliminate these accounts as part of the process of defining the audit population.

It is important that the auditor understands the taxpayer's chart of accounts and is able to make an informed decision as to which accounts should be included in the audit population and which ones should be removed. The potential impact of including accounts with no use tax implications in the population is to reduce sampling efficiency. The potential impact of excluding accounts which have use tax liability is to reduce the validity of the audit results. Remember that the results of a statistical sample can only be projected back to the items that were included in the audit population.

What Is Stratification?

Stratification is the process of dividing the population of invoices into segments (strata) based upon some characteristics. In use tax audits, we stratify the population on the dollar amount of the invoice.

Why We Stratify?

We stratify on the dollar amount of the invoice in order to accomplish the following:

1. To gain sampling efficiency. A stratified random sample will usually yield more precise results than an unrestricted random sample of the same size.
2. To offset the effect of extreme values (skewed distributions). The typical population of sales or purchase invoices will usually have a number of

extremely large invoices. In order to minimize the effect that these large invoices may have on the sample results, we have the auditor look at 100% of the invoices in the largest dollar stratum.

It is important to stress that the method used to stratify the population of records effects only the sampling efficiency, not the validity of the sample results.

How We Stratify the Population

We stratify the audit population using the amount of the invoice as the basis of the stratification. The actual dollar amounts included in each stratum is determined by the distribution of the invoices in the population. We usually have 10 to 20 strata. Although there are statistical techniques available for determining the most efficient basis for stratifying a population, the techniques may produce strata that are confusing to the taxpayer. Therefore, we choose to set the boundaries of the strata in more uniform amounts such as a stratum with invoices greater than or equal to $100 and less than $500. In addition, we also strive to get a reasonable distribution of the invoices in the population across the strata. We would not want the vast majority of invoices in one or two strata. There is usually some trial and error before we finally settle on a particular stratification.

We also encourage both auditor and taxpayer participation in the definition of the strata for a population of invoices. While we lose some sampling efficiency using this method, we feel that it is a more desirable method because it is less confusing to the taxpayer. It is important that the auditor is able to explain to the taxpayer why the population was stratified the way it was.

All of the invoices in the strata containing the largest dollar invoices (both positive and negative) are selected for examination by the auditor. This enables us to ensure that unusually large invoices do not exert an undue influence on the total population assessment. Since all the invoices in these strata are examined, the only influence these invoices will have on the total population assessment is their actual value. Thus, if an invoice in one of these strata results in an increase in the taxpayer's liability of $10,000, the impact of this invoice on the total population assessment is only $10,000. The calculation of the total population assessment is discussed in Part 6 of this manual.

ACL is used to stratify the population.

Using TSEP to Calculate the Sample Size

Once the population has been stratified, TSEP requires the following information to calculate the sample size:

1. Confidence Level. We use a 75% confidence level.
2. Required Precision. We use a 25% precision requirement.

Statistical Sampling for Sales and Use Tax Audits

3.   Expected Error Rate. This can vary based on the expectations of the auditor regarding the occurrence of errors in the population.

4.   Minimum sample size in a stratum. We require that the minimum sample size in a stratum be 50. In cases where the stratum has less than 50 invoices, we would look at 100% of the items. A sample of 30 is usually considered the smallest sample size where the normal approximation can be used safely. In this sense, 30 is sometimes called a "large" sample.

It is important to emphasize that the sample size is based on assumptions (particularly the expected error rate and assumptions about the distribution of the errors in the population) which may or may not be correct. After the evaluation of the sample results, it may be determined that a larger sample is needed in order to achieve the desired precision. In this case, additional sample units can be drawn. The table below shows examples of the total number of records submitted by various taxpayers, the audit population size and the sample size using TESP.

Total # of Records Submitted by Taxpayer	Audit Population Size	Sample Size
28,070	28,070	736
523,255	523,255	3,227
6,423	6,423	1,060
2,199	2,199	463
312,396	312,396	1,247
346,583	45,944	531
346,583	32,627	437
346,583	6,322	315
346,583	10,224	358
15,580	13,479	755
11,956	11,956	529
116,590	116,590	835
9,532	9,532	908
11,338	11,338	1,216
68,001	42,726	2,083

One important observation that you should note from the above table is that there is not a direct relationship between the audit population size and the sample size. This is because the amount of variation in the dollar amount of the invoices in the population has a greater impact on sample size than simply the size of the population. Thus, a sample from a population of records with many large dollar items is going to require a larger sample than would be required from a population of the same size but with fewer large dollar items.

Randomizing the Population and Selecting the Sample

Statistical Sampling for Sales and Use Tax Audits

After using TSEP to determine the sample size by strata, the next step is to use ACL to draw the sample. ACL requires the user to enter a seed for its random number generator. The random number seed is a value entered by the user which ACL uses to generate a random number for each record. These random numbers are used by ACL to select the invoices which comprise the sample.

The same random number seed will also produce the same sequence of random numbers. It is important that a record of the random number seed for a given sample be retained in case additional sample items need to be drawn.

Importing the Sample into a Spreadsheet

Once the sample is drawn, the electronic records are imported into a spreadsheet which the auditor uses to conduct the audit. One of the major benefits of our statistical sampling procedures is that a major portion of the auditor's workpapers are generated using a computer rather than the auditor having to enter the data manually.

Statistical Sampling for Sales and Use Tax Audits

Case Study

The stratification of the population and the sample sizes for each stratum for our case study is included in Appendix 3. Part of this information is reproduced below. As you can see, the audit population is 25,690 invoices, enough to make a 100% examination impractical. It was decided to stratify the population based on the invoice amounts presented below:

Lower Boundary	Upper Boundary	Number In Stratum	Sample Size
-9,999,999.99	-2,500.01	16	16
-2,500.00	-100.01	377	50
-100.00	-.01	600	50
0.00	9.99	1194	50
10.00	24.99	2771	50
25.00	49.99	2940	50
50.00	74.99	1900	50
75.00	99.99	1578	50
100.00	149.99	2300	50
150.00	249.99	2660	50
250.00	499.99	2897	52
500.00	999.99	1928	68
1,000.00	2,499.99	1189	92
2,500.00	10,000.00	814	201
10,000.01	9,999,999.99	63	63
		23,227	942

As you can see, TSEP projected that we needed a sample of 942 invoices. You should note that in every stratum, the minimum sample size is 50. This is consistent with statistical sampling theory which considers a sample size of 30 or more as a large sample. You should also note that we select 100% of the records in the strata that have the largest absolute values (the top and bottom strata above). This enables us to ensure that an unusually large invoice will not unduly skew the sample results. Finally, you should note that the larger the absolute value of range of the stratum, the larger the sample size as a proportion of the stratum.

The instructor will demonstrate the following:

1. How ACL is used to stratify a population.
2. How TSEP is used to calculate the sample size.
3. How ACL is used to select the sample.
4. How the sample is imported into a spreadsheet.

Statistical Sampling for Sales and Use Tax Audits

Part 5. Auditing the Taxpayer's Records

Objectives

On completing this part of the course, participants will be able to:

- Explain to taxpayers the procedure for auditing positive and negative invoice amounts.

Overview

In general, the use of statistical sampling does not change the standard audit procedures used by the Audit Division. Frequently, however, the electronic data received by the Audit Division from a taxpayer will include records that have negative values for the amount field as well as records that have positive values. It is important that the auditor use a consistent procedure for determining the taxability of these records. The purpose of this part of the document is to define the procedure auditors should follow when auditing these types of records.

Use Tax Audit

For simplicity in the discussion below, the following assumptions are made:

- The audit is a use tax audit.
- The sampling unit is an invoice.
- The taxpayer is self-accruing the tax.
- The invoice is either entirely taxable or entirely exempt.
- A positive value is an expense purchase by the taxpayer.
- A negative value is a situation where the taxpayer has returned the item(s) purchased to the vendor.
- On purchases, the taxpayer either accrued the full amount of tax or did not accrue any tax.
- On returns, the taxpayer either recovered the full amount of tax or did not recover any tax.

Since all invoices in the population are "represented" in the sample, the decision regarding the taxability of the invoice should stand-alone; that is to say, it should not be dependent on the examination of another invoice in the population or sample. The decision matrices below establish the decision the auditor should make on a change in the taxpayer's liability for positive and negative invoices.

Positive Invoice Amounts - Purchases

When auditing a purchase, the auditor must answer two questions:

Statistical Sampling for Sales and Use Tax Audits

1. Is the purchase use taxable?
2. If yes, did the taxpayer accrue the correct tax on the purchase?

The decision matrix below identifies the auditing outcomes based on the answers to these questions.

	Invoice Taxable	**Invoice Not Taxable**
Taxpayer Accrued Tax	No Change in Tax	Negative Change in Tax
Taxpayer Did Not Accrue Tax	Positive Change in Tax	No Change in Tax

Negative Invoice Amounts - Returns

When auditing a returned item, the auditor must answer two questions:

1. Is the purchase use taxable?
2. If yes, did the taxpayer recover the tax on the purchase?

The decision matrix below identifies the auditing outcomes based on the answers to these questions.

	Invoice Taxable	**Invoice Not Taxable**
Taxpayer Recovered Tax	No Change in Tax	Positive Change in Tax
Taxpayer Did Not Recover Tax	Negative Change in Tax	No Change in Tax

The above decision matrix is independent of whether the taxpayer actually accrued tax on the original purchase.

Sales Tax Audit

In a sales tax audit, it is the Audit Division's procedure not to include credit invoices in the population. This is because of the information needed to make a determination on how to treat a non-taxable sale on which the customer has paid tax. In order to make this determination, the auditor needs to know whether the taxpayer has refunded the tax to the customer. This requires that the auditor review any credit invoices related to that sale. If credit invoices were also included in the population, then the requirement that invoices from the same stratum have an equal chance of being selected would be violated. This is because some credit invoices would have more than one chance of being selected for review.

For simplicity in the discussion below, the following assumptions are made:

Statistical Sampling for Sales and Use Tax Audits

- The audit is a sales tax audit.
- The sampling unit is an invoice.
- The invoice is either entirely taxable or entirely exempt.
- A positive value is a sale by the taxpayer.
- A negative value is an item returned to the taxpayer.
- On sales, the customer either paid the correct amount of tax or did not pay any tax.
- The taxpayer posted all Tennessee tax collected to the correct tax accrual accounts.
- All tax in the Tennessee tax accrual account is remitted to the state.

Positive Invoice Amounts – Sales

When auditing a sale, the auditor must answer two questions:

1. Is the sale taxable?
2. If yes, did the customer pay the correct amount of tax on the sale?

The decision matrix below identifies the auditing outcomes based on the answers to these questions.

	Invoice Taxable	**Invoice Not Taxable**
Customer Paid Tax	No Change in Tax	If taxpayer refunded tax to customer and did not recover the tax from the State, then Negative Change in Tax. **OR Else** No Change in Tax
Customer Did Not Pay Tax	Positive Change in Tax	No Change in Tax

On a non-taxable sale where the customer paid sales tax, the above decision matrix makes a negative change in tax contingent of whether the taxpayer refunded the tax to its customer. This is because Tennessee Code Annotated § 67-6-514 provides that:

> When the tax collected for any period is in excess of that provided by law, the total tax collected shall be paid over to the commissioner, less any compensation allowed to the dealer as hereinafter set forth.

Statistical Sampling for Sales and Use Tax Audits

Also, Tennessee Code Annotated § 67-1-1802 (a)(1) provides that:

> Sales or use taxes which were collected from or passed on to customers by the taxpayer shall not be refunded unless the taxpayer has refunded or credited the sales or use tax to its customers.

And Rule 1320-5-1-79 provides that:

> Persons who have overpaid Sales or Use Tax to the State may file a Claim for Refund for any taxes paid within the time period provided at T.C.A. §67-1-707. Such person's records must show that customers have been refunded the Sales or Use Tax, or that they have been given credit for such tax, where this is the basis for the refund. No credit for overpayment of taxes may be given unless a person claiming credit would have a right to receive the credit by means of a Claim for Refund.

Thus, the taxpayer will be given credit in the sample for any tax refunded to its customers if the taxpayer has not recovered this tax from the state.

Negative Invoice Amounts – Sale Item Returned

As noted above, it is the Audit Division's procedure not to include credit invoices in the population. Consequently, either the taxpayer or the auditor can use credit invoices as additional information without violating the requirement that all invoices in a stratum have an equal probability of being selected.

For example, suppose a taxpayer is assessed tax on an invoice in the sample because the taxpayer did not charge the customer tax on a taxable sale but the customer subsequently returned the items. The taxpayer would be allowed to introduce the credit invoice showing that the customer returned the items. This would result in the taxpayer not being assessed tax on the original invoice.

Statistical Sampling for Sales and Use Tax Audits

Part 6. Audit Results

Objectives

On completing this part of the course, participants will be able to:

- Explain in detail the results of a statistical sample to taxpayers.
- Explain to taxpayers the decision matrix as it applies to the audit results.

Calculating the Total Population Assessment

After the auditor has completed the examination of the invoices included in the sample, the completed spreadsheet is returned to the Audit Support Unit. The data file is imported into TSEP. TSEP calculates the total population assessment and the 75% confidence level for the sample and produces an output entitled "Assessment Results Report." For each sample, a report is produced for state taxes and another report is produced for local taxes. Copies of these reports for our case study are included in Appendix 4.

It is critical that auditors understand these reports and are able to explain them to the taxpayer. The following is a detailed discussion of the information included on these reports.

The report has a line on it for each stratum in the population and sample. The information for each stratum includes the following:

1. The lower and upper boundaries of the stratum.
2. The total dollar amount of errors found in the stratum on invoices examined by the auditor. The sum of this column represents the total dollar amount of errors found in the sample. These errors may represent a change in either tax or taxable.
3. The sample size for that stratum. This is the number of invoices examined by the auditor from that stratum.
4. The average error per invoice in the sample for that stratum. This is derived by dividing the total dollar amount of the errors for a stratum by the number of invoices in the sample for that stratum.
5. The total number of invoices in the population for that stratum.
6. The projected error per stratum. This is derived by multiplying the average error per invoice in a stratum by the total number of invoices in the population for that stratum.

The total population assessment is derived by summing the projected error for each stratum. These calculations are based on simple arithmetic. The total population assessment can be either positive (i.e., an assessment) or negative (i.e., a credit).

Statistical Sampling for Sales and Use Tax Audits

The Department is legislatively required to allocate any change in a taxpayer's state tax liability (either an assessment or a refund) to the appropriate state revenue funds. More specifically, revenues from the one percent (1%) increase in the state sales tax rate and the state sales tax on single articles, both effective on or after July 15, 2002, are allocated to different state revenue funds than the rest of the state sales tax revenues. Therefore, the auditor must identify in his or her workpapers if the change in the taxpayer's state sales tax liability is due to the one percent (1%) increase in the state sales tax or the state tax on single articles. When calculating a change in a taxpayer's state sales tax liability for both assessments and refunds, the Department must identify what portion of the change is due to errors associated with either the state sales tax increase or the state single article.

Another reason for identifying the portion of the change in a taxpayer's state sales tax liability due to changes in the sales tax law effective on or after July 15, 2002 is to ensure that the taxpayer is not overcharged penalty and/ interest. Since these errors could not have occurred prior to July 2002, it would be unfair to the taxpayers to apply any changes in their liability due to these errors to any months in the audit period prior to July 2002.

75% Confidence Level

The total population assessment is a single observation among a very large number of possible values of the total population assessment which could be taken from the very same population. Because of the scientific method used, the true, but unknown, total population assessment is the mean of the distribution of all possible total population assessments values which could be obtained from this audit population using random samples of the same size. Given the Central Limit Theorem (see Appendix 10 of this manual), the total population assessment has a 50% chance of being too high and a 50% chance of being too low. Thus, if we assessed a taxpayer at the total population assessment, we would be 50% confident that the taxpayer owes at least as much as is being assessed.

The management of the Audit Division of the Department of Revenue has established the policy that we want to be 75% confident that the taxpayer owes at least as much as is being assessed. This requires reducing the amount of the assessment by an amount that would enable us to be 75% confident that the true liability is greater than the amount being assessed. In the case of a credit, the Department wants to be 75% sure that it owes the taxpayer at least as much as is being credited. Consequently, when the audit has resulted in an assessment, the Department uses the 75% lower confidence level. When the audit has resulted in a credit, the Department uses the 75% upper confidence level. The use of the lower and upper confidence level is entirely a result of whether the total population assessment is positive or negative.

A statistical sample audit will result in an assessment when the total population assessment is positive and the 75% lower confidence level (LCL) is positive. A statistical sample audit will result in a credit when the total population assessment is negative and the 75% upper confidence level (UCL) is negative.

Statistical Sampling for Sales and Use Tax Audits

It is possible that two other results may happen. It is possible that the total population assessment is positive and the 75% LCL is negative or that the total population assessment is negative and the 75% UCL is positive. When the former case occurs, the Department is not 75% confident that the taxpayer owes any additional tax; when the latter occurs, the Department is not 75% confident that it owes the taxpayer a credit. In both cases, the audit results would be a no tax due audit.

The 75% confidence level is a value which is calculated by TSEP. The statistical formulas used to calculate the 75% confidence level are presented in Appendix 8. This is the only calculation on the report which the auditor is not expected to be able to explain to the taxpayer how it was derived. However, it is critical that the auditor understand the concept of the 75% confidence level so that he or she can explain it to the taxpayer. A decision matrix which summarizes the rules discussed in this section is included in Appendix 5.

Case Study

The Assessment Results Report (i.e., audit results) for our case study is included in Appendix 4. In this case, the auditor examined each invoice in the sample to determine if the taxable amount of the invoice was correct. If it was not, the auditor would enter the change in the tax amount of the invoice in the audit workpapers. For example, in the $0.01 to $9.99 stratum for total state sales tax (see Appendix 4-1), the total errors (i.e., the total net change in tax) were $1.01. Since 50 items were sampled from that stratum, the average error for the stratum is $0.020192($1.01/50). Since there were 1194 invoices in the population stratum, the average error is multiplied by the number of invoices to derive the projected error for the stratum of $24.11 ($0.020192*1194). These calculations are repeated for each stratum in the population. The total population assessment (estimated total due) for our case study is $37,968.09, which is the sum of the projected error for each stratum.

According to the decision matrix included in Appendix 5, since the total population assessment is positive, we will use the 75% lower confidence level (LCL). In this case, the 75% LCL is $34,396.46. By using the 75% LCL, the Department of Revenue is able to say that it is 75% confident that the true change in the taxpayer's taxable amount is at least $34,396.46.

A measure which is used to evaluate the results of a statistical sample is the sampling precision. As used in this manual, the sampling precision is the difference between the 75% confidence level and the total population assessment expressed as a percentage of the total population estimate. The closer the precision is to 0%, the more precise the estimate. In this case, the precision is derived by subtracting $34,396.46 (the 75% LCL) from $37,968.09 (the total population assessment), dividing this number by the total population assessment, and multiplying it times 100 to express it in a percentage. The precision for our case study is 9.41%. Our goal is to have a sampling precision of 25% or less.

Statistical Sampling for Sales and Use Tax Audits

In cases where the total population assessment is positive, poor precision works to the advantage of the taxpayer. In cases where the total population assessment is negative, poor precision works to the advantage of the State. The precision of a sample can be improved by taking a larger sample. If the sampling precision is higher than 25%, both the Department and the taxpayer have the right to request a larger sample in order to improve the sampling precision. However, the rule of thumb in statistics is that it takes four times as large of a sample to cut a given precision in half. Thus, in the example above, to improve the precision from 9.41% to 4.705% would require drawing an additional sample of almost 4000 invoices.

As noted above, the Department is required to allocate any change in the taxpayer's liability to the appropriate state revenue fund. Therefore, the Department must report the amount of the change in the taxpayer's state tax liability due to the one percent (1%) state sales tax increase and/or the state sales tax on single articles. This is accomplished by calculating the percentage of the taxpayer's total population assessment for state sales tax due to errors relating to the one percent (1%) state sales tax increase, the amount due to errors relating to the state single article, and the amount due to other errors. These percentages are then applied to the appropriate 75% confidence level amount for the change in the taxpayer's total state liability.

Appendices 4-2 – 4-4 show how much of the change in the state tax liability was due to the rate increase, state single article, or to some other error on the part of the taxpayer. For example, $1,998.58 of the change in the taxpayer's total state liability was due to errors relating the one percent (1%) sales tax increase (see Appendix 4-3). Similarly, $4,228.20 of the change was due to errors relating to the state single article (see Appendix 4-4). Appendix 4-6 shows how these numbers are used to calculate the percentages of the total change in the taxpayer's state tax liability due the one percent (1%) increase, the state single article, or some other sales tax error. These percentages are then applied to the amount of the assessment or credit at the appropriate 75% confidence level.

Incorporating Statistical Sampling Audit Results into Audit Workpapers

Since a statistical sample is representative of the population of invoices from which it was drawn, the results of the sample should be apportioned throughout the audit period. The results should be apportioned based on the percent of the total expenses made during the audit period for each month. This is particularly important when there is a long-term trend in the taxpayer's expenses.

Appendix 4-7 illustrates the results of our case study. In our case study, the audit period was from December 1999 to March 2003. The percent of total expenses during the audit period for each month is calculated by Audit Support from the electronic data used to define the audit population. This percentage is applied to the state sales tax of $28,755.43 (see Appendix 4-6) and $13,362.58 local tax (see Appendix 4-5) to determine each month's share of the change. In this case, the total expenses for the audit period were

Statistical Sampling for Sales and Use Tax Audits

$9,883,243.30. In January 2000, for example, the taxpayer's expenses were $177,359.34. This represents 1.79% of the total expenses for the audit period. The state tax audit result of $28,755.43 was multiplied by 1.79%, yielding $516.03 change in the state tax amount for that month. For the one percent (1%) increase and the state single article, only the periods from October 2002 to March 2003 were used since it is the Department's procedure to apply these errors only to periods on or after October 2002.

Statistical Sampling for Sales and Use Tax Audits

Part 7. Audit Workpapers

Objectives

On completing this part of the course, participants will be able to:

- Fully document the application of statistical sampling procedures to an audit.
- Enter the results of a statistical sample in the sales tax audit program and explain this procedure to the taxpayer.
- Enter the required information from a statistical sample in the Revenue Audit Report (RAP).

Documentation of a Statistical Sample

In order for a sample to be considered a valid statistical sample, the procedures for defining the population and drawing the sample must be capable of being replicated by an independent person (e.g., a statistical consultant). Therefore, it is critical that the application of these procedures to a specific audit must be clearly and completely documented.

Entering Results in Sales Tax Audit Program

In Part 6, we discussed the method for apportioning the results of a statistical sample across the audit period. This section describes how the apportioned results of a statistical sample are to be entered into the Sales Tax Audit Program. The Sales Tax Audit Program is used to calculate any interest and/or penalty due as the result of the audit.

After the results of the audit have been apportioned across the audit period, then follow the steps below for entering the data into the Sales Tax Audit Program (in the example below it is assumed that results are based on tax owed):

Statistical Sampling for Sales and Use Tax Audits

Audit Support will provide an Excel file containing the results of a statistical sample. Do the following to import this data into your invoice table in the Tax Template:

1. Select main menu item Sales and Use Tax Information
2. Select Import Statistical Sample Results
3. Select Import Statistical Sample Data on the following dialog box
4. This should open a dialog box (Open Statistical Sample Results) to select the file. Find and select a file by first clicking a directory and then clicking the desired file to highlight. Clicking the Open button on the left will bring up a dialog box indicating the directory of the chosen file. Click OK to proceed.
5. Using the drop down box on the next dialog box, select an account for which the statistical data relates and click OK to accept the selection.
6. Using the drop down box on the next dialog box, select a transaction type to use and click OK to accept the selection.
7. A dialog box will indicate if this procedure was successful or not. Clicking OK will complete the process.

Completing the Revenue Audit Report (RAP)

For each statistical sample performed in an audit, the following information must be entered into the relevant explanation section of RAP:

- Source of data – e.g., the accounts payable system or all financial transactions.
- Time period covered by electronic data – explain if different from audit period.
- Procedure for verifying the electronic data – i.e., check totals.
- Identification of the sampling unit – e.g., invoice, line item, etc.
- Accounts selected and procedure for selecting the accounts. If the list of accounts is long, include as a supplement.
- Cost centers selected and procedure for selecting the cost centers. If the list of cost centers is long, include as a supplement.
- Total number of records submitted by taxpayer.
- Total number of records included in the population from which the sample was drawn.
- Explanation of any other criteria used to exclude records from the audit population. If the list of criteria is long, include as a supplement.
- Explanation of any summarization that results in a reduction in the number of records included in the population – e.g., line items summed to derive invoice amounts.
- Any deviation from the procedure outlined in this manual.

In addition, the list of sample units examined by the auditor along with the determination of the results of that examination should be included in the audit workpapers.

Statistical Sampling for Sales and Use Tax Audits

Case Study

For our case study, the following information should be entered into the explanation section of RAP. As can be seen from the table below, the taxpayer submitted 29,795 records. Each record represents a line item on an invoice. In this case, the taxpayer and auditor had agreed on which accounts and cost centers would be included in the population. However, records outside the audit period had to be identified and removed. The remaining records were summed into invoices. Zero dollar invoices were then removed, leaving the audit population of 23,227. TSEP, as noted earlier, calculated a sample size of 942 invoices.

Source of Data	Expenses
Records received from taxpayer	29,795
Records outside audit period removed (Audit period = Dec. 1999 – March 2003)	-1,380
Sub-total	28,415
28,415 line items represented 23,478 unique transactions from which the sample was pulled	
Sub-total of unique transactions	23,478
Zero invoice amounts removed	-251
Population size	23,227
Sample size	942 unique transactions 1,158 lines of data make up the unique transactions
The lines of data with the same vendor number, invoice number and invoice date were summed together to identify unique transactions.	

In our case study, the general ledger accounts were used to define the population of invoices to be included in the audit population. Appendix 11 includes the first page (of 11 pages) of the total number of invoices and their total dollar amount by account number and year that were included in the audit. This information was used to both verify that the electronic data was complete and to document the accounts included in the audit population.

Finally, Appendix 12 includes the first page (of 22 pages) of all the transactions included in the sample along with the results of the examination of these transactions by the auditor.

Statistical Sampling for Sales and Use Tax Audits
Appendix 1. Computer Assisted Audit Request

Taxpayer Information	
Taxpayer's Name Taxpayer's Street Address Taxpayer's City, State, Zip Audit Contact and Phone No. Tax Manager and Phone Number MIS Contact and Phone Number	

Audit Information	
Entity ID **ALL** RITS Case Number(s) Account Number(s) Audit Period Is there a claim for refund within the audit period? Status of Claim If the claim is to be audited, is an electronic copy available? Fiscal Year Statistical Sample Computer Assisted Detail Date audit will start When sample or detail is needed How sample or detail is to be sorted	Yes ☐ No ☐ Claim Amount: $ ☐Audited & Approved ☐To Be Audited ☐Denied Yes ☐ No ☐ Sales ☐ Use ☐ Fixed Asset ☐ Other ☐ Sales ☐ Use ☐ Fixed Asset ☐ Other ☐

Lead Auditor Information	
Name Phone Number DG Number Office Supervisor	

Assistant Auditor Information	
Name(s) Phone Number(s) DG Number(s) Office(s) Supervisor(s)	

Statistical Sampling for Sales and Use Tax Audits

Appendix 2. Electronic Data Record Layout Form

Please fill out and attach with electronic data.

Data should be returned to:

Name of Company   <u>Class Example</u>

_____

Medium   _____

_____

Label   _____

_____

Record Length   _____

_____

Block Size   _____

Please mail data to: Tennessee Dept. of Revenue
ATTN: Audit Support
500 Deadrick Street

Record Count   _____

6th Floor Andrew Jackson Bldg.
Nashville, TN 37242

or e-mail to: Support.Data@state.tn.us

File Layout

Start Position	End Position	Field Length	Field Name	Field Description	Alpha (√ if True)	Date Format (mmddyyyy)	Numeric (√ if True)	No. of Decimals	Packed (√ if True)	Zoned (√ if True)
1	5	5	Vendor No		√					
6	27	22	Vendor Name		√					
28	48	21	Invoice No		√					
49	54	6	Date			mmddyy				
55	60	6	Account No		√					
61	69	9	Invoice Amt				√	2		
70	75	6	Check No		√					

Statistical Sampling for Sales and Use Tax Audits

Appendix 3. TSEP Stratification and Sample Size Report
Class Example

Stratum	Lower Boundary	Upper Boundary	Stratum Size	Stratum Total	Standard Deviation	Sample Size
1	-$18,339.44	-$2,500.01	16	-$91,618.28	3,905	16
2	-$2,500.00	-$100.01	377	-$168,281.98	422	50
3	-$100.00	-$0.01	600	-$25,525.23	29	50
4	$0.00	$9.99	1,194	$6,923.17	2	50
5	$10.00	$24.99	2,771	$48,394.25	4	50
6	$25.00	$49.99	2,940	$105,816.62	7	50
7	$50.00	$74.99	1,900	$117,121.25	7	50
8	$75.00	$99.99	1,578	$137,739.45	7	50
9	$100.00	$149.99	2,300	$281,975.11	15	50
10	$150.00	$249.99	2,660	$515,231.26	29	50
11	$250.00	$499.99	2,897	$1,033,077.00	71	52
12	$500.00	$999.99	1,928	$1,365,061.13	144	68
13	$1,000.00	$2,499.99	1,189	$1,800,747.02	409	92
14	$2,500.00	$10,000.00	814	$3,765,963.97	1,918	201
15	$10,000.01	$39,208.00	63	$990,618.56	5,794	63

Sample size of 942 out of 23227   Expected Error Rate 5.00%   Allocation Method: Neyman (Optimal)
Confidence Level = 75.00%   Predicted Precision: Total 11.72%   Lower Confidence Limit 23.44%
Observed precision depends on actual error rate found in the audit.

Tennessee Department of Revenue
Audit Division

Statistical Sampling for Sales and Use Tax Audits

Appendix 4-1. Assessment Results Report – Total State Tax
Class Example

| | | | | Difference Estimator | | | | |
Stratum	Lower Boundary	Upper Boundary	Total Errors	Sample Size	Average Error	Stratum Size	Projected Assessment	Sample Standard Deviation
1	-$18,339.44	-$2,500.01	-$1,102.74	16	-$68.921300	16	-$1,102.74	$150.18
2	-$2,500.00	-$100.01	$0.00	50	$0.000000	377	$0.00	$0.00
3	-$100.00	-$0.01	$0.00	50	$0.000000	600	$0.00	$0.00
4	$0.00	$9.99	$1.01	50	$0.020192	1,194	$24.11	$0.09
5	$10.00	$24.99	$3.26	50	$0.065272	2,771	$180.87	$0.28
6	$25.00	$49.99	$14.72	50	$0.294408	2,940	$865.56	$0.75
7	$50.00	$74.99	$18.42	50	$0.368412	1,900	$699.98	$1.12
8	$75.00	$99.99	$4.58	50	$0.091500	1,578	$144.39	$0.65
9	$100.00	$149.99	$23.71	50	$0.474276	2,300	$1,090.83	$1.90
10	$150.00	$249.99	$76.35	50	$1.526964	2,660	$4,061.72	$3.91
11	$250.00	$499.99	$146.97	52	$2.826273	2,897	$8,187.71	$7.33
12	$500.00	$999.99	$61.95	68	$0.911006	1,928	$1,756.42	$6.25
13	$1,000.00	$2,499.99	$617.33	92	$6.710054	1,189	$7,978.25	$24.86
14	$2,500.00	$10,000.00	$2,473.25	201	$12.304725	814	$10,016.05	$49.16
15	$10,000.01	$39,208.00	$4,064.93	63	$64.522667	63	$4,064.93	$338.92
Totals			$6,403.73	942		23,227	$37,968.09	$5,295.31

Estimated Total Due: $37,968.09   Lower Confidence Limit: $34,396.
Sample Size: 942   Population Size: 23,227
Date/Time this assessment was calculated: 01/09/04 2:00:23 PM

Tennessee Department of Revenue
Audit Division

Statistical Sampling for Sales and Use Tax Audits

Appendix 4-2. TSEP Assessment Results Report – State Tax less 1% and SSA
Class Example
Difference Estimator

Stratum	Lower Boundary	Upper Boundary	Total Errors	Sample Size	Average Error	Stratum Size	Projected Assessment	Sample Standard Deviation
1	-$18,339.44	-$2,500.01	-$846.67	16	-$52.916925	16	-$846.67	$115.00
2	-$2,500.00	-$100.01	$0.00	50	$0.000000	377	$0.00	$0.00
3	-$100.00	-$0.01	$0.00	50	$0.000000	600	$0.00	$0.00
4	$0.00	$9.99	$0.79	50	$0.015792	1,194	$18.86	$0.08
5	$10.00	$24.99	$2.82	50	$0.056472	2,771	$156.48	$0.28
6	$25.00	$49.99	$14.72	50	$0.294408	2,940	$865.56	$0.75
7	$50.00	$74.99	$18.42	50	$0.368412	1,900	$699.98	$1.12
8	$75.00	$99.99	$4.58	50	$0.091500	1,578	$144.39	$0.65
9	$100.00	$149.99	$23.71	50	$0.474276	2,300	$1,090.83	$1.90
10	$150.00	$249.99	$76.35	50	$1.526964	2,660	$4,061.72	$3.91
11	$250.00	$499.99	$144.44	52	$2.777619	2,897	$8,046.76	$7.34
12	$500.00	$999.99	$51.13	68	$0.751888	1,928	$1,449.64	$6.20
13	$1,000.00	$2,499.99	$584.75	92	$6.355924	1,189	$7,557.19	$24.56
14	$2,500.00	$10,000.00	$1,710.95	201	$8.512188	814	$6,928.92	$44.37
15	$10,000.01	$39,208.00	$1,567.64	63	$24.883143	63	$1,567.64	$322.02
Totals			$3,353.62	942		23,227	$31,741.31	$5,168.27

Estimated Total Due: $31,741.31
Sample Size: 942   Population Size: 23,227
Date/Time this assessment was calculated: 01/06/04 8:49:43 AM

Tennessee Department of Revenue
Audit Division

Appendix 4 - 2

01/06/04 9:13:14 AM

Appendix 4-3. TSEP Assessment Results Report – 1% State Rate Increase
Class Example
Difference Estimator

Stratum	Lower Boundary	Upper Boundary	Total Errors	Sample Size	Average Error	Stratum Size	Projected Assessment	Sample Standard Deviation
1	-$18,339.44	-$2,500.01	$0.00	16	$0.000000	16	$0.00	$0.00
2	-$2,500.00	-$100.01	$0.00	50	$0.000000	377	$0.00	$0.00
3	-$100.00	-$0.01	$0.00	50	$0.000000	600	$0.00	$0.00
4	$0.00	$9.99	$0.22	50	$0.004400	1,194	$5.25	$0.02
5	$10.00	$24.99	$0.44	50	$0.008800	2,771	$24.38	$0.04
6	$25.00	$49.99	$0.00	50	$0.000000	2,940	$0.00	$0.00
7	$50.00	$74.99	$0.00	50	$0.000000	1,900	$0.00	$0.00
8	$75.00	$99.99	$0.00	50	$0.000000	1,578	$0.00	$0.00
9	$100.00	$149.99	$0.00	50	$0.000000	2,300	$0.00	$0.00
10	$150.00	$249.99	$0.00	50	$0.000000	2,660	$0.00	$0.00
11	$250.00	$499.99	$2.53	52	$0.048654	2,897	$140.95	$0.35
12	$500.00	$999.99	$10.82	68	$0.159118	1,928	$306.78	$0.92
13	$1,000.00	$2,499.99	$32.58	92	$0.354130	1,189	$421.06	$1.94
14	$2,500.00	$10,000.00	$0.00	201	$0.000000	814	$0.00	$0.00
15	$10,000.01	$39,208.00	$1,100.15	63	$17.462698	63	$1,100.15	$68.77
Totals			$1,146.74	942		23,227	$1,998.58	$343.15

Estimated Total Due: $1,998.58
Sample Size: 942   Population Size: 23,227
Date/Time this assessment was calculated: 01/06/04 9:12:56 AM

Tennessee Department of Revenue
Audit Division

Statistical Sampling for Sales and Use Tax Audits

Appendix 4-4. TSEP Assessment Results Report - SSA
Class Example
Difference Estimator

Stratum	Lower Boundary	Upper Boundary	Total Errors	Sample Size	Average Error	Stratum Size	Projected Assessment	Sample Standard Deviation
1	-$18,339.44	-$2,500.01	-$256.07	16	-$16.004375	16	-$256.07	$35.26
2	-$2,500.00	-$100.01	$0.00	50	$0.000000	377	$0.00	$0.00
3	-$100.00	-$0.01	$0.00	50	$0.000000	600	$0.00	$0.00
4	$0.00	$9.99	$0.00	50	$0.000000	1,194	$0.00	$0.00
5	$10.00	$24.99	$0.00	50	$0.000000	2,771	$0.00	$0.00
6	$25.00	$49.99	$0.00	50	$0.000000	2,940	$0.00	$0.00
7	$50.00	$74.99	$0.00	50	$0.000000	1,900	$0.00	$0.00
8	$75.00	$99.99	$0.00	50	$0.000000	1,578	$0.00	$0.00
9	$100.00	$149.99	$0.00	50	$0.000000	2,300	$0.00	$0.00
10	$150.00	$249.99	$0.00	50	$0.000000	2,660	$0.00	$0.00
11	$250.00	$499.99	$0.00	52	$0.000000	2,897	$0.00	$0.00
12	$500.00	$999.99	$0.00	68	$0.000000	1,928	$0.00	$0.00
13	$1,000.00	$2,499.99	$0.00	92	$0.000000	1,189	$0.00	$0.00
14	$2,500.00	$10,000.00	$762.30	201	$3.792537	814	$3,087.13	$21.67
15	$10,000.01	$39,208.00	$1,397.14	63	$22.176825	63	$1,397.14	$68.90
Totals			$1,903.37	942		23,227	$4,228.20	$1,079.86

Estimated Total Due: $4,228.20
Sample Size: 942   Population Size: 23,227
Date/Time this assessment was calculated: 01/06/04 9:36:48 AM

Tennessee Department of Revenue
Audit Division

Statistical Sampling for Sales and Use Tax Audits

Appendix 4-5. TSEP Assessment Results Report – Local Tax
Class Example
Difference Estimator

Stratum	Lower Boundary	Upper Boundary	Total Errors	Sample Size	Average Error	Stratum Size	Projected Assessment	Sample Standard Deviation
1	-$18,339.44	-$2,500.01	-$317.50	16	-$19.843847	16	-$317.50	$43.12
2	-$2,500.00	-$100.01	$0.00	50	$0.000000	377	$0.00	$0.00
3	-$100.00	-$0.01	$0.00	50	$0.000000	600	$0.00	$0.00
4	$0.00	$9.99	$0.30	50	$0.005922	1,194	$7.07	$0.03
5	$10.00	$24.99	$1.06	50	$0.021177	2,771	$58.68	$0.10
6	$25.00	$49.99	$5.52	50	$0.110403	2,940	$324.58	$0.28
7	$50.00	$74.99	$6.91	50	$0.138155	1,900	$262.49	$0.42
8	$75.00	$99.99	$1.72	50	$0.034313	1,578	$54.15	$0.24
9	$100.00	$149.99	$8.89	50	$0.177854	2,300	$409.06	$0.71
10	$150.00	$249.99	$28.63	50	$0.572612	2,660	$1,523.15	$1.47
11	$250.00	$499.99	$54.16	52	$1.041607	2,897	$3,017.54	$2.75
12	$500.00	$999.99	$19.17	68	$0.281958	1,928	$543.62	$2.33
13	$1,000.00	$2,499.99	$219.28	92	$2.383471	1,189	$2,833.95	$9.21
14	$2,500.00	$10,000.00	$1,282.69	201	$6.381563	814	$5,194.59	$30.51
15	$10,000.01	$39,208.00	$1,015.26	63	$16.115179	63	$1,015.26	$131.73
Totals			$2,326.09	942		23,227	$14,926.63	$2,319.60

Estimated Total Due: $14,926.63 Lower Confidence Limit: $13,362.09
Sample Size: 942   Population Size: 23,227
Date/Time this assessment was calculated: 01/06/04 9:42:58 AM

Tennessee Department of Revenue
Audit Division

Appendix 4-5

Statistical Sampling for Sales and Use Tax Audits

Portion of LCL

TAXPAYER NAME:	Class Example
TYPE OF SAMPLE:	Use Tax
FEIN NUMBER:	99-9999999

LOWER CONFIDENCE LEVEL CALCULATION

75% LCL from Combined State	34,396.46		

	Total Population Assessment	Percent of Assessment	LCL
State Sales Tax	31,741.31	83.599965129%	28,755.43
One Percent	1,998.58	5.263841294%	1,810.58
SSA	4,228.20	11.136193577%	3,830.46
Total	37,968.09	100.000000000%	34,396.46

LOCAL LCL	13,362.09

FILL IN THESE AMOUNTS

Statistical Sampling for Sales and Use Tax Audits
Percent of Sales Applied

DATE	COUNT	AMOUNT	PERCENT FOR STATE S	STATE LCL	LOCAL LCL	AMT SINCE LAW CHANGE	PERCENT FOR LAW CHANGE	ONE PERCENT	SSA
12/15/99	502	209,924.30	2.124042621%	610.78	283.82	0.00	0.000000000%	0.00	0.00
01/15/00	524	177,359.34	1.794545926%	516.03	239.79	0.00	0.000000000%	0.00	0.00
02/15/00	485	180,251.18	1.823805956%	524.44	243.70	0.00	0.000000000%	0.00	0.00
03/15/00	406	134,050.96	1.356345847%	390.02	181.24	0.00	0.000000000%	0.00	0.00
04/15/00	285	123,553.36	1.250129702%	359.48	167.04	0.00	0.000000000%	0.00	0.00
05/15/00	585	194,091.17	1.963840858%	564.71	262.41	0.00	0.000000000%	0.00	0.00
06/15/00	561	234,143.12	2.369091936%	681.24	316.56	0.00	0.000000000%	0.00	0.00
07/15/00	559	229,429.04	2.321394233%	667.53	310.19	0.00	0.000000000%	0.00	0.00
08/15/00	569	196,425.36	1.987458510%	571.50	265.57	0.00	0.000000000%	0.00	0.00
09/15/00	555	207,570.47	2.100226249%	603.93	280.63	0.00	0.000000000%	0.00	0.00
10/15/00	543	244,349.50	2.472361477%	710.94	330.36	0.00	0.000000000%	0.00	0.00
11/15/00	582	204,410.61	2.068254355%	594.74	276.36	0.00	0.000000000%	0.00	0.00
12/15/00	481	203,223.66	2.056244634%	591.28	274.76	0.00	0.000000000%	0.00	0.00
01/15/01	546	257,575.83	2.606187283%	749.42	348.24	0.00	0.000000000%	0.00	0.00
02/15/01	577	202,245.28	2.046345252%	588.44	273.43	0.00	0.000000000%	0.00	0.00
03/15/01	589	227,201.42	2.298854871%	661.05	307.18	0.00	0.000000000%	0.00	0.00
04/15/01	622	241,368.97	2.442204069%	702.27	326.33	0.00	0.000000000%	0.00	0.00
05/15/01	613	261,670.50	2.647617711%	761.33	353.78	0.00	0.000000000%	0.00	0.00
06/15/01	559	198,611.44	2.009577564%	577.86	268.52	0.00	0.000000000%	0.00	0.00
07/15/01	560	205,306.70	2.077321116%	597.34	277.57	0.00	0.000000000%	0.00	0.00
08/15/01	544	248,344.15	2.512779889%	722.56	335.76	0.00	0.000000000%	0.00	0.00
09/15/01	627	262,669.31	2.657723806%	764.24	355.13	0.00	0.000000000%	0.00	0.00
10/15/01	708	324,654.47	3.284898086%	944.59	438.93	0.00	0.000000000%	0.00	0.00
11/15/01	626	249,589.09	2.525376361%	726.18	337.44	0.00	0.000000000%	0.00	0.00
12/15/01	575	236,588.87	2.393838367%	688.36	319.87	0.00	0.000000000%	0.00	0.00
01/15/02	561	273,373.86	2.766033899%	795.38	369.60	0.00	0.000000000%	0.00	0.00
02/15/02	503	176,529.69	1.786151414%	513.62	238.67	0.00	0.000000000%	0.00	0.00
03/15/02	611	263,784.84	2.669010890%	767.49	356.64	0.00	0.000000000%	0.00	0.00
04/15/02	572	254,140.94	2.571432598%	739.43	343.60	0.00	0.000000000%	0.00	0.00
05/15/02	518	245,524.14	2.484246644%	714.36	331.95	0.00	0.000000000%	0.00	0.00
06/15/02	555	234,087.52	2.368529367%	681.08	316.49	0.00	0.000000000%	0.00	0.00
07/15/02	565	319,289.32	3.230612769%	928.98	431.68	0.00	0.000000000%	0.00	0.00
08/15/02	540	285,620.73	2.889949395%	831.02	386.16	0.00	0.000000000%	0.00	0.00
09/15/02	593	301,457.23	3.050185256%	877.09	407.57	0.00	0.000000000%	0.00	0.00
10/15/02	706	357,811.46	3.620385021%	1,041.06	483.76	357,811.46	17.245364171%	312.24	660.58
11/15/02	861	378,082.82	3.825493399%	1,100.04	511.17	378,082.82	18.222378673%	329.93	698.00
12/15/02	777	355,464.15	3.596634619%	1,034.23	480.59	355,464.15	17.132231362%	310.19	656.24
01/15/03	777	311,247.60	3.149245552%	905.58	420.81	311,247.60	15.001135540%	271.61	574.61
02/15/03	770	418,417.63	4.233606492%	1,217.39	565.70	418,417.63	20.166387083%	365.13	772.46
03/15/03	535	253,803.27	2.568016007%	738.44	343.14	253,803.27	12.232503171%	221.48	468.56
		9,883,243.30	100.000000000%	28,755.43	13,362.09	2,074,826.93	100.000000000%	1,810.58	3,830.46

Statistical Sampling for Sales and Use Tax Audits

Appendix 5-1. Decision Matrix for 75% Confidence Level

Total Population Assessment	75% Confidence Level	Decision	Interpretation
Assessment > $0	75% LCL > $0	Assess at the 75% LCL.	The Department of Revenue is 75% confident that the taxpayer owes at least this amount.
Assessment > $0	75% LCL < $0	No tax due.	The Department is not 75% confident that the taxpayer owes any additional tax.
Assessment < $0	75% UCL > $0	No refund.	The Department is not 75% confident that the taxpayer is due a refund.
Assessment < $0	75% UCL < $0	Refund at the 75% UCL.	The Department of Revenue is 75% confident that the taxpayer is due at least this amount.

Statistical Sampling for Sales and Use Tax Audits

Appendix 6. Glossary of Statistical Terms

Basic Theory, Concepts and Terms

The **audit population** is the total set of units or elements from which the sample is to be drawn. In statistics books, the audit population would be referred to as the sampling frame. For a use tax audit, the population is usually the total set of invoices or vouchers from which the sample is to be drawn. The **sampling unit** is the individual unit or element which is to be sampled. For a use tax audit, the sampling unit may be an invoice, a voucher, or a line item from an invoice. Throughout this manual, it will be assumed that the sampling unit is an invoice.

The **sample** is the set of units selected from the population which will be audited. A **random sample** is a method of sampling where each member of the population has an equal chance of being selected. A **statistical sample** is a randomly selected sample.

The **parameter** is the population value or characteristic which the auditor is estimating. In a use tax audit, the parameter which the auditor is usually estimating is the total change in the taxpayer's taxable base or tax. A **statistic** is the value or characteristic derived from a sample such as the mean error per invoice. The statistic is used to estimate a population parameter.

The sample **mean** is a measure of central tendency obtained by summing the values of all the invoices in the sample and dividing by the number of invoices in the sample. The **point estimate** is the estimated value of the population parameter. The **total population assessment** is the parameter that is estimated in a sales or use tax audit.

The **variance** is a measure of the dispersion of the values of a set of data about the mean. The **standard deviation** is the square root of the variance. A large standard deviation relative to the mean is an indication that there is a lot a variability in the data. The **standard error of the mean** is the standard deviation of a sampling distribution.

An important theorem in statistical sampling is the **Central Limit Theorem**. The Central Limit Theorem states the following:

> If random samples of *n* observations are drawn from a population with a
> finite mean and standard deviation, then, when *n* is large, the sample mean
> is approximately normally distributed, with a mean equal to the population
> mean and a standard deviation equal to the population standard deviation
> divided by the square root of the sample size. This approximation will
> become more and more accurate as *n* becomes large.

A **normal probability distribution** is a bell-curve. Approximately 68 percent of the area of a normal distribution lies within one standard deviation of the mean, 95 percent

Statistical Sampling for Sales and Use Tax Audits

within two standard deviations of the mean, and almost all of the area within three standard deviations of the mean.

Confidence levels are the degree of confidence, expressed in terms of probability, that the estimated population parameter will fall within an interval or range of values. The Department of Revenue uses the **75% confidence level** in estimating a change in the taxpayer's liability. In the case of an assessment, the Department uses the 75% Lower Confidence Level. This enables the Department to be 75% confident that the taxpayer owes the Department at least the amount being assessed. In the case of a credit, the Department uses the 75% Upper Confidence Level. This enables the Department to be 75% confident that the Department owes the taxpayer at least the amount being credited.

Stratification is the process of dividing the population of invoices into segments (strata) based upon some characteristic such as the dollar amount of the invoices. Normally, stratification increases **sampling efficiency**, thus enabling the Department to draw a smaller sample. A **stratum** (plural, strata) is a section, layer or division within a population. For example, if the population is stratified on the dollar amount of the invoice, then a stratum might be the invoices greater than or equal to $100 and less than $500. In a **stratified random sample**, the population is divided into strata and independent random samples are drawn from each stratum.

Statistical Sampling for Sales and Use Tax Audits

Appendix 7. Frequently Asked Questions

Below are some questions asked by taxpayers, tax practitioners, and other individuals who are interested in learning more about the Department's statistical sampling program.

Is it necessary for the taxpayer to have electronic records in order to perform a statistical sample?

No. However, performing a statistical sample on manual records is usually not practical because the auditor needs to be able to (1) determine the number of records in the population and (2) ensure that each member of the population has an equal probability of being selected. These requirements are usually difficult to meet if the records are not stored electronically. Additionally, stratifying the population in order to increase sampling efficiency is not feasible when the records are not stored electronically.

Why do we stratify the population of invoices?

We stratify the population of invoices in order to increase our sampling efficiency.

Why do we examine 100% of the largest dollar stratum?

We examine all of the invoices in the largest dollar stratum in order to ensure that an error on a large dollar invoice will not skew the sample results.

How are the dollar ranges of the strata established?

The dollar ranges of the strata are set to ensure a reasonable distribution of invoices. Although there are scientific ways to set the values of the dollar ranges, these methodologies can result in strata with very odd dollar ranges. Consequently, we have decided to set the values of the ranges using amounts that make sense to the taxpayer and the auditor. Although we loose some sampling efficiency using this method, it is important to emphasize that the method of stratifying the population effects only the sample's efficiency, not its validity.

Why do we use the 75% confidence level in projecting a change in the taxpayer's liability?

In those cases where the sample results indicates that the taxpayer owes additional tax, the Audit Division management has established the policy that we want to be 75% confident that the taxpayer owes at least as much as the amount being assessed. Conversely, in those cases where the sample results indicate that the state owes the taxpayer a refund, we want to be 75% confident that the state owes the taxpayer at least as much as the amount being refunded. If the total population assessment was used with no confidence level, we would only be 50% confident that the taxpayer owes at least as much as is being assessed.

Statistical Sampling for Sales and Use Tax Audits

Are there circumstances under which we would want to draw additional sample items?

Yes. Both the taxpayer and the state reserves the right to draw additional sample items. In general, we would consider drawing additional sample items in those cases where the amount of variation in the sample data has resulted in unusually poor sampling precision.

How should the auditor go about selecting expense accounts to be included as part of the audit population?

This is an area where auditor judgment and experience are critical. The auditor should select those accounts that include the types of transactions on which she feels thinks incorrect tax was paid or self-accrued. The auditor should discuss with the taxpayer which accounts are going to be included in the population. The taxpayer should have the opportunity to select any accounts in which tax may have been over-accrued.

How do your auditors select accounts?

The auditor will use the chart of accounts and eliminate any accounts that are not necessary for use tax purposes. (For example, the salary expense account would not be sampled because salary has no sales or use tax implication in Tennessee.)

Do you draw different samples for different locations?

The preference would be to leave all locations in the same population. The result of the sample can be apportioned according the original population. If this is unsatisfactory to the taxpayer the locations can be sampled separately. If each location has to be sampled separately, you can expect the sample size to be multiplied by the number of locations. (For example, if all locations are sampled together the sample size might be 950 invoices. If all four locations need to be sampled separately you can expect the sample size to be 3800 or 950 invoices times 4 locations.)

What are some of the problems that taxpayers encounter in retrieving electronic data?

Taxpayers often change computer systems during the audit period and cannot retrieve data from the old computer system. We also see a lot of cut-backs in the information systems (IS) personnel which makes it very hard to find someone who knows how to handle a special request such as retrieving data for an audit. Some taxpayers have out sourced the IS functions also. In this instance, the contractor will charge the taxpayer a very high hourly rate for this special request.

What type of documentation do your auditors usually need to audit electronic records?

The auditors will need the use tax or sales tax invoices. They will either need the original document or access to the taxpayer's system so they can see the scanned version of the invoice.

Statistical Sampling for Sales and Use Tax Audits

What are some of the difficulties that taxpayers and auditors face in retrieving back-up documentation? Can some of these problems be alleviated if more complete electronic data were available?

Taxpayers often have the invoices stored off-site, in warehouses, at individual locations, etc. Once the sample is selected, the taxpayer would have to find the invoices wherever they are located. If the electronic data has all of the information from the invoice such as item description, shipping amount, tax amount, etc. the auditor would very rarely need to go back to the original invoice.

What is your procedure for dealing with missing documentation (e.g., the paper invoice cannot be located)?

First the auditor would gather all of the other invoices from the same vendor as the missing invoice and determine if the vendor handled tax consistently on all of the other invoices that are not missing. The auditor would also try to find the invoice number on the accrual report. If the auditor were still not satisfied, the invoice would be taxed. In Tennessee it is the taxpayers responsibility to keep all books and records within the audit period. Ultimately, it is the taxpayer's responsibility to prove that tax was paid on the invoice. However, the auditor will do everything possible to be reasonable and look at other supporting evidence if the taxpayer is making a good effort to keep the records required and this missing invoice is the exception, and very few documents are out of place.

Statistical Sampling for Sales and Use Tax Audits

Appendix 8. Technical Documentation of Statistical Sampling Methodology

8.1. Introduction

In this section we cover some of the concepts of statistical sampling and illustrate their use by simple examples. Section 8.2 is devoted to the mathematical formulae and methodology utilized by the Tennessee Department of Revenue. A brief discussion of the computational algorithms is contained in section 8.3.

We will begin our discussion with some definitions which are fundamental to the understanding of statistical sampling.

Population: The collection of all items of interest. For our purposes, it is the collection of all invoices during an audit period.

Sample: A sample is a collection of objects taken from a population.

8.2 Mathematical Formulae

The primary reference for this section is **Sampling Techniques**, 3rd Edition, by William G. Cochran, John Wiley & Sons, 1977. The notation contained in that reference will be used exclusively. Interested readers should consult that reference for the theoretical details supporting the formulae.

Along with each formula, the reader will be provided with a, hopefully, plain language explanation of the formula and its relationship to the other formulae. There is some background notation to get through before we begin.

Notation

A capital sigma, $\sum$, is used to indicate a sum of terms. The full notation also contains a number or expression below the $\sum$ and another one above it. These are the "indices of summation." For example, $\sum_{i=1}^{n} y_i$, means to sum the sequence of numbers labeled y_i from $i = 1$ to $i = n$. When the indices of summation are obvious they may be left off.

A bar above a letter means the sample average of the observations identified by that letter. Both $\bar{\bar{y}}$ and $\bar{y}_h$ represent averages. The first is the average of a sample of observations y_i, $i = 1, \ldots, n$ and the second the average of the h-th group of observations y_{hi}, $i = 1, \ldots n_h$. This is important because we will subdivide the population of invoices into a moderately large number of strata (usually 20 or fewer). The average sample assessment for the h-th strata would be $\bar{y}_h$.

The basic sampling unit in this discussion is the invoice. The population of invoices is stratified in order to create sub-populations which are more homogeneous (i.e. the invoices within a stratum are more similar to each other in size and more different from those outside the stratum). Throughout all the formulae that follow, h represents the stratum and i represents the sample unit within the stratum. Thus, for the h-th stratum, the following notation will be used:

N_h — total number of invoices in the stratum

n_h — number of invoices in the sample

y_{hi} — value obtained (either a taxable amount or an assessment) from the i-th invoice

$W_h = \dfrac{N_h}{N}$ — weight for the h-th stratum

$f_h = \dfrac{n_h}{N_h}$ — The proportion of invoices in the sample from the stratum – also known as "sampling fraction"

$\bar{Y}_h = \dfrac{\sum\limits_{i=1}^{N_h} y_{hi}}{N_h}$ — true mean (the numerator would be the true total) for the h-th stratum

$\bar{y}_h = \dfrac{\sum\limits_{i=1}^{n_h} y_{hi}}{n_h}$ — sample mean for the h-th stratum.

$S_h^2 = \dfrac{\sum\limits_{i=1}^{N_h} (y_{hi} - \bar{Y}_h)^2}{N_h - 1}$ — true variance for the stratum.

The stratum weight is important. If the stratum accounts for 20% of the invoices in the population, then a 20% weight is given to the sample total in estimating the population total.

Giving each stratum equal weight in the estimate when they do not have equal weight in the population would greatly bias the resulting estimate of the total. This should never be done.

The sampling fraction is also important. If the sampling fraction exceeds .05, then a finite population correction factor should be applied to the estimated variance and standard deviation. Leaving the correction out could result in an estimated variance which is too large.

Estimators

The estimator of the population total based on L strata is given by

$$\hat{Y}_{st} = \sum_{h=1}^{L} N_h \bar{y}_h = N \sum_{h=1}^{L} W_h \bar{y}_h \ .$$

This means that the estimate of the total of the assessment (or taxable amounts) is simply a weighted sum of the sample means of the strata. The weight for each stratum is the number of invoices in the stratum. It is easy to see why weighting is necessary by considering the following example.

Suppose a population consists of only two strata. One stratum has 1000 invoices with an true, but unknown, average assessment of $4.50 and the other has 10000 invoices with a true, but unknown, average assessment of $2.00. The true, but unknown, assessment is

$$\text{True Assessment} = Y = 1000 \times \$4.50 + 10000 \times \$2.00 = \$24,500.00$$

Suppose further that a sample of size 50 is taken from each with sample means of $4.40 and $2.10, respectively. The correct estimate is given by

$$\begin{aligned}
\hat{Y}_{st} &= 1000 \times \$4.40 + 10000 \times \$2.10 \\
&= \$4400 + \$21000 \\
&= \$25400
\end{aligned}$$

while the estimate based upon simple averaging of the stratum estimates times the number of invoices is given by

$$\begin{aligned}
\tilde{Y} &= 11000 \times \left(\frac{\$4.40 + \$2.10}{2}\right) \\
&= 11000 \times \$3.25 \\
&= \$35750
\end{aligned}$$

The second method is in error because it did not take into account the different number of invoices in each stratum.

Standard Error of Estimation for Total Assessment

In order to compute a confidence interval for the total assessment, we must calculate the standard deviation of the distribution of all possible estimates. This is known as the "standard error of estimation." The calculation for this is done by putting together two formulae:

Sample standard Deviation for h-th stratum: $s_h = \sqrt{\dfrac{1}{n_h - 1} \sum_{i=1}^{n_h} (y_{hi} - \bar{y}_h)^2}$

This is the usual sample standard deviation for a sample. It is applied to each stratum. Once this is done, those values are combined to get the standard error of estimation for the total.

Standard error of estimation for total (including the finite population correction factor):

$$s(\hat{Y}_{st}) = \sqrt{\sum_{h=1}^{L} N_h(N_h - n_h)\frac{s_h^2}{n_h}}$$

$$= \sqrt{\sum_{h=1}^{L} N_h^2(1 - f_h)\frac{s_h^2}{n_h}}$$

The sample sizes used in statistical auditing of taxpayer records allows the normal distribution to be used. Thus, the $(1-\alpha)100\%$ lower confidence limit is given by $\hat{Y}_{st} - zs(\hat{Y}_{st})$ where z stands for the value of a standard normal with α probability in the right hand tail. The upper confidence limit is obtained by changing the "-" to "+".

Example

Suppose there are three strata with the following sample and population values:

Stratum	N_h	n_h	$\overline{Y}_h$	s_h^2
1	538	50	42.88	827.76
2	1229	75	327.51	19218.33
3	1455	62	771.45	64163.93

$$\hat{Y}_{st} = 538 \times 42.88 + 1229 \times 327.51 + 1455 \times 771.45$$
$$= 1,548,038.98$$

$$s(\hat{Y}_{st}) = \sqrt{538 \times (538 - 50) \times \frac{827.76}{50} + 1229 \times (1229 - 75) \times \frac{19218.33}{75} + 1455 \times (1455 - 62) \times \frac{64163.93}{62}}$$
$$= \sqrt{4346468.4288 + 363422720.2104 + 2097550093.2734}$$
$$= \sqrt{2465324281.9126}$$
$$= 49652.032$$

The z-values for various confidence levels (one-sided) are given in the following table:

Confidence Level	z-value
75%	0.675
90%	1.2816
95%	1.645
99%	2.326

Thus, the lower 75% confidence level for the total is given by

$$LCL = 1,548,038.98 - 0.675 \times 49652.032 = 1,514,523.86$$

after rounding. We are 75% confident that the true, but unknown, population total exceeds 1,514,523.86. Our best estimate for the true value is 1,548,038.98.

8.3 Computer Algorithms

The Tax Stratification and Estimation Program (TSEP) uses a provisional means procedure to calculate the mean and standard deviation of the data in each stratum while making only one through the data set. The program decides which stratum the record belongs to with the invoice amount and uses the assessment amount for the calculation of assessment due. The algorithm is calculated recursively for each stratum as follows:

$$Diff = (Assess - Mean)$$
$$N = N + 1$$
$$Mean = Mean + (Diff/ N)$$
$$S = S + (Diff * (Assess - Mean))$$

where Assess is the value of the current case and all other values are initially set to zero. Note that "=" stands for "replace the value of the item on the left side of "=" with the value of the right side." Hence, the value of Mean in the fourth row is not the same as the value of Mean in the first row as it has been changed in the third row. After all records are processed, N is the total number of cases, Mean is the average value, S is the sum of squares and $S/(N-1)$ is the sample variance.

This algorithm avoids the numerical instability obtained by using the computational formulae found in most elementary statistics books. Additionally, all computations are done in double precision to guarantee no significant loss in precision (precision is greater than 15 decimal digits in every case).

After calculating the sample mean and sample variance for each stratum, the program combines them with the total number of invoices and the sample size in each stratum to obtain the estimated values for total assessment, standard error of estimation for that total, coefficient of variation (standard error/total), and precision. The lower limit of a one sided confidence interval of size 75%, 90%, 95%, or 99%, depending upon the value requested by the user, is also computed.

Statistical Sampling for Sales and Use Tax Audits

Appendix 9. Selected Statistical Sampling Bibliography

Books

Arkin, Herbert. *Handbook of Sampling for Auditing and Accounting*. McGraw-Hill Book Company, 1984, 3rd Edition.

Roberts, Donald M. *Statistical Auditing*. American Institute of Certified Public Accountants, 1978.

Articles

Adams, Virginia N. and Johnson, Kirk L. "Increasing Auditor Productivity Through Automated Statistical Sampling of Taxpayer Records," *Revenue Administration, 1988.* Federation of Tax Administrators, 1988.

Adams, Virginia N. and Johnson, Kirk L. "Automating Statistical Sampling to Improve Auditor Productivity," *1989 Workshop on Tax Administration.* Federation of Tax Administrators, 1989.

Internet Sites

Internet Glossary of Statistical Terms -
http://www.animatedsoftware.com/statglos/statglos.htm

Statistical Sampling for Sales and Use Tax Audits

Appendix 10. Account List

Year	Account_No	Invoice_Amt	COUNT
2000	110000	2,397.43	13
2000	120500	16,140.66	22
2000	130000	77,818.65	258
2000	130600	4,632.29	50
2000	136805	38,487.30	106
2000	160200	7,128.56	48
2000	160210	1,251.08	24
2000	161400	3,784.75	18
2000	180000	1,806.49	83
2000	180010	3,776.99	15
2000	210000	1,985.43	4
2000	220400	97,293.56	9
2000	220500	77,297.81	24
2000	230000	188,005.45	145
2000	230600	144,017.30	86
2000	236805	672.22	14
2000	260200	45.00	1
2000	261500	68,248.47	22
2000	280000	144.65	6
2000	310000	30,167.56	133
2000	320000	0.00	2
2000	320500	2,603.48	17
2000	330000	54,963.43	178
2000	330100	34,785.79	250
2000	330110	81.19	1
2000	330200	13,906.41	51
2000	330600	15,174.80	121
2000	330700	222.79	52
2000	360101	29,061.29	14
2000	360102	11,952.89	49
2000	360200	2,960.78	16
2000	380000	28,731.74	44
2000	410000	20,136.34	170
2000	420500	3,039.59	15
2000	430000	134,093.33	746
2000	430600	23,827.13	95
2000	435000	117,700.37	214
2000	435100	3,224.99	150
2000	436600	246,586.74	1,065
2000	460200	8,961.55	48
2000	480000	7,438.08	128
2000	510000	11,429.00	2
2000	510500	4,283.82	8

Statistical Sampling for Sales and Use Tax Audits

2000	530000	3,703.53	35
2000	530010	6,779.14	36
2000	530011	30,959.21	27
2000	530012	53,242.57	126
2000	530013	56,556.01	275
2000	530016	82,394.37	11
2000	530018	15,625.25	12
2000	530020	10,020.82	33
2000	530100	3,160.56	11
2000	530600	6,644.38	32
2000	560200	45.00	1
2000	580000	20,471.11	82
2000	610000	251,666.03	486
2000	610020	5,877.53	55
2000	610500	3,012.48	1
2000	630000	17,348.04	143
2000	630020	6,765.83	52
2000	630600	6,413.88	14
2000	630620	1,784.40	28
2000	660220	4,171.64	26
2000	680000	3,186.37	12
2000	680020	2,237.97	12
2000	730000	11,272.75	145
2000	730100	84.65	1
2000	730500	2,143.97	3
2000	730600	35,329.07	351
2000	780000	269.05	8
2000	810000	538.86	7
2000	830000	22,788.14	120
2000	830600	5,506.70	24
2000	860200	959.00	4
2000	880000	2,817.27	110
2000	910000	20,388.79	132
2000	910050	8,037.84	73
2000	910070	9,039.10	58
2000	910500	3,241.12	12
2000	930000	17,180.76	79
2000	930050	772.12	11
2000	930070	491.38	5
2000	930600	6,867.75	37
2000	930650	5,937.16	12
2000	930670	2,037.06	13
2000	935000	37,512.94	73
2000	935050	676.00	1
2000	935070	990.00	1
2000	980000	1,149.49	24
2000	980050	493.50	7

Statistical Sampling for Sales and Use Tax Audits

2001	120010	54.13	1
2001	120500	48,249.79	26
2001	130000	84,542.48	332
2001	130600	4,823.66	45
2001	136805	43,240.65	101
2001	160200	18,971.14	58
2001	160210	1,570.69	12
2001	161400	14,747.51	29
2001	180000	5,325.07	49
2001	180010	1,991.76	9
2001	210000	33.23	1
2001	220400	114,374.40	14
2001	220500	73,300.50	25
2001	230000	211,619.70	130
2001	230600	167,304.75	97
2001	236805	1,135.10	15
2001	260200	45.00	1
2001	261400	2,579.30	3
2001	261500	97,598.76	31
2001	280000	861.24	33
2001	310000	25,406.55	127
2001	320000	769.61	6
2001	320500	1,897.43	13
2001	330000	62,758.66	210
2001	330100	27,332.10	183
2001	330200	18,118.26	74
2001	330600	19,144.87	145
2001	330700	-10,855.77	62
2001	360101	43,665.64	13
2001	360102	20,050.71	56
2001	360200	4,329.68	17
2001	361400	9,254.41	4
2001	380000	10,259.01	70
2001	410000	11,373.17	93
2001	410001	1,237.44	20
2001	410002	1,216.34	19
2001	410003	7,422.91	34
2001	410004	3,527.62	32
2001	420500	4,494.24	14
2001	420501	949.21	9
2001	420502	949.19	9
2001	420503	89.54	1
2001	420504	823.20	7
2001	420505	766.82	4
2001	430000	128,290.26	516
2001	430001	1,850.48	38

Statistical Sampling for Sales and Use Tax Audits

2001	430002	1,412.14	60
2001	430003	2,493.20	74
2001	430004	3,827.49	85
2001	430005	44,028.98	96
2001	430600	21,406.54	68
2001	430601	56.57	1
2001	430602	56.56	1
2001	430603	652.36	2
2001	430604	726.61	6
2001	435000	112,548.77	146
2001	435004	850.00	5
2001	435005	9,618.40	27
2001	435050	975.75	4
2001	435100	-948.46	190
2001	435101	59.98	4
2001	435102	-13.99	2
2001	435103	566.25	11
2001	435104	86.60	5
2001	435105	294.05	16
2001	436600	196,189.88	772
2001	460200	6,055.10	39
2001	460201	84.95	2
2001	460202	45.00	1
2001	460203	556.00	7
2001	460204	326.90	6
2001	460205	278.25	4
2001	461401	2,762.19	29
2001	461402	16,901.67	110
2001	461403	54,094.85	270
2001	461404	37,030.31	261
2001	461405	1,639.72	13
2001	480000	16,162.78	69
2001	480001	791.06	23
2001	480002	1,490.67	35
2001	480003	907.87	19
2001	480004	781.55	19

Statistical Sampling for Sales and Use Tax Audits

Appendix 11. Sample

Line#	Vendor#	Invoice_No	Invc Date	Acct#	Line Item	Check#	Total Invoice Amt.	Cnt	State Tax Due	Local Tax Due	SSA Tax Due	1% tax rate increase due	Notes/Determination
1	00018		02/01/00	910070	320.00	086191	640.00	2	0.00	0.00	0.00	0.00	
2	00018		02/01/00	410000	320.00	086191	640.00	2	0.00	0.00	0.00	0.00	
3	00018	1106	08/02/01	410000	425.00	181392	425.00	1	0.00	0.00	0.00	0.00	
4	00022	#2	06/22/00	310000	1,295.00	116037	1,295.00	1	0.00	0.00	0.00	0.00	
5	00027	126627	06/25/02	610000	17,187.69	239407	17,187.69	1	0.00	0.00	0.00	0.00	
6	00027	126627	08/25/02	610000	8,773.64	251822	8,773.64	1	0.00	0.00	0.00	0.00	
7	00027	126663	09/05/02	910000	196.56	251822	196.56	1	0.00	0.00	0.00	0.00	
8	00027	126627	09/24/02	610000	14,276.36	257923	14,276.36	1	0.00	0.00	0.00	0.00	
9	00027	126627	10/22/02	610000	25,343.98	259260	25,343.98	1	0.00	0.00	0.00	0.00	
10	00027	126627	11/24/02	610000	9,346.48	268441	9,346.48	1	0.00	0.00	0.00	0.00	
11	00027	81M10847	01/22/03	610000	16,777.78	275751	16,777.78	1	0.00	0.00	0.00	0.00	
12	00027	82N10921	02/23/03	910000	930.00	280679	930.00	1	0.00	0.00	0.00	0.00	
13	00038	2687-CM	08/09/01	330100	(367.76)	198828	(367.76)	1	0.00	0.00	0.00	0.00	
14	00038	49434	01/24/03	330100	1,097.48	277608	1,097.48	1	0.00	0.00	0.00	0.00	
15	00046	309732-1	08/16/00	330600	88.65	123230	88.65	1	0.00	0.00	0.00	0.00	
16	00057	009639	07/10/01	610020	121.80	179740	121.80	1	7.31	2.74	0.00	0.00	Tax due on transaction
17	00111	608-660R0S5	08/22/01	180010	65.94	249684	65.94	1	3.96	1.48	0.00	0.00	Tax due on transaction
18	00345	336	04/30/02	730100	(9.49)	233195	(9.49)	1	0.00	0.00	0.00	0.00	
19	00345	222511	05/30/02	730100	28.34	241138	28.34	1	0.00	0.00	0.00	0.00	
20	00362	011296	04/19/00	530010	(764.60)	107226	(764.60)	1	0.00	0.00	0.00	0.00	
21	00362	014521	11/07/00	530012	2,771.22	146837	2,771.22	1	0.00	0.00	0.00	0.00	
22	00362	20321 ACCT #	03/13/02	630620	9.06	221838	9.06	1	0.00	0.00	0.00	0.00	
23	00370	330362	06/03/02	610000	1,221.06	238901	1,221.06	1	0.00	0.00	0.00	0.00	
24	00535	1826	04/07/02	610000	384.33	228682	384.33	1	0.00	0.00	0.00	0.00	
25	00575	11008443	02/08/01	610000	87.94	155051	87.94	1	0.00	0.00	0.00	0.00	
26	00703	87195	08/24/00	330000	14.58	128096	14.58	1	0.00	0.00	0.00	0.00	
27	00945	326078	04/18/01	630000	63.46	163908	63.46	1	0.00	0.00	0.00	0.00	

Statistical Sampling for Sales and Use Tax Audits

28	01152	1998 EMPLOYMENT LAW	12/15/02	160200	159.00	267324	159.00	1	9.54	3.58	0.00	0.00	Tax due on transaction
29	01392	19316386	04/13/02	120500	928.06	232820	928.06	1	0.00	0.00	0.00	0.00	
30	01616	3782-910335-01007	04/17/00	436600	40.33	104610	3,036.90	2	0.00	0.00	0.00	0.00	
31	01616	3782-910335-01007	04/17/00	136805	2,996.57	104610	3,036.90	2	0.00	0.00	0.00	0.00	
32	02282	H683023	06/26/00	230000	3,036.68	117679	3,036.68	1	0.00	0.00	0.00	0.00	
33	02296	11245395	11/19/02	530013	105.00	266841	105.00	1	0.00	0.00	0.00	0.00	
34	02388	528301000	05/28/01	380000	35.72	171811	35.72	1	0.00	0.00	0.00	0.00	
35	02454	2126000312	10/11/00	436600	1,120.66	149552	1,120.66	1	0.00	0.00	0.00	0.00	
36	02857		09/03/01	136805	5.00	185847	5.00	1	0.00	0.00	0.00	0.00	
37	03175	53165	05/16/00	430000	256.69	110053	256.69	1	0.00	0.00	0.00	0.00	
38	03175	62926	06/16/00	130000	846.37	113305	846.37	1	0.00	0.00	0.00	0.00	
39	03175	81212	08/08/00	430000	363.64	121512	363.64	1	0.00	0.00	0.00	0.00	
40	03175	94072	09/21/00	430000	(36.52)	131792	(36.52)	1	0.00	0.00	0.00	0.00	
41	03175	95834	09/28/00	430000	260.77	131792	260.77	1	0.00	0.00	0.00	0.00	
42	03175	103335	10/17/00	430000	1,040.39	135062	1,040.39	1	0.00	0.00	0.00	0.00	
43	03175	12413	12/21/00	430000	1,104.69	148127	1,104.69	1	0.00	0.00	0.00	0.00	
44	03175	15085	01/25/01	330000	52.52	157337	52.52	1	0.00	0.00	0.00	0.00	
45	03175	41070	04/04/01	430000	1,072.45	162948	1,072.45	1	0.00	0.00	0.00	0.00	
46	03175	45739	04/26/01	430000	99.87	166402	99.87	1	0.00	0.00	0.00	0.00	
47	03175	50321	05/02/01	430000	756.16	166722	756.16	1	0.00	0.00	0.00	0.00	
48	03175	22016	02/12/02	530011	2,384.96	219616	2,384.96	1	0.00	0.00	0.00	0.00	
49	03175	33670	03/19/02	130000	541.25	223535	541.25	1	0.00	0.00	0.00	0.00	
50	03175	64669	06/24/02	430000	241.17	241142	241.17	1	0.00	0.00	0.00	0.00	
51	03175	80958	08/06/02	530011	2,420.04	246298	2,420.04	1	0.00	0.00	0.00	0.00	
52	03175	12386	01/14/03	430000	818.72	274476	818.72	1	0.00	0.00	0.00	0.00	
53	03176	53166	05/16/00	130000	(313.12)	110054	(313.12)	1	0.00	0.00	0.00	0.00	
54	03177	100601	10/02/02	430000	(487.13)	259098	(487.13)	1	0.00	0.00	0.00	0.00	
55	03506	252636	02/10/03	730100	(456.01)	279827	(456.01)	1	0.00	0.00	0.00	0.00	
56	03506	253589	02/11/03	730100	(451.68)	279827	(451.68)	1	0.00	0.00	0.00	0.00	
57	03545	3110	03/16/00	610000	114.84	101209	114.84	1	0.00	0.00	0.00	0.00	
58	03556	GOLF HOLE SPONSOR	08/15/02	435004	425.00	246626	425.00	1	0.00	0.00	0.00	0.00	
59	03651	0517485-IN	10/30/02	730100	65.79	264196	65.79	1	0.00	0.00	0.00	0.00	

Statistical Sampling for Sales and Use Tax Audits

60	03872	11-6-97	11/06/02	330200	75.00	265675	75.00	1	0.00	0.00	0.00	0.00
61	03880	030951	11/07/02	730100	54.20	264198	54.20	1	0.00	0.00	0.00	0.00
62	04740	01-429755-01	04/22/00	530013	55.00	105376	55.00	1	0.00	0.00	0.00	0.00
63	04740	01-562093-01	11/11/00	530013	5.50	139063	5.50	1	0.00	0.00	0.00	0.00
64	04741	01-461736-01	06/10/00	530013	5.50	112723	5.50	1	0.00	0.00	0.00	0.00
65	04741	01-626546-01	02/14/01	530013	5.50	152962	5.50	1	0.00	0.00	0.00	0.00
66	04741	01-716102-01	06/22/01	530013	5.50	174817	5.50	1	0.00	0.00	0.00	0.00
67	04741	0000428203	04/28/02	530013	16.50	228827	16.50	1	0.00	0.00	0.00	0.00
68	04741	0001536203	06/10/02	530013	165.00	236598	165.00	1	0.00	0.00	0.00	0.00
69	04742	31998	03/19/03	330200	114.19	284344	114.19	1	0.00	0.00	0.00	0.00
70	04917	SPONSOR 1996 CLASSIC	01/19/01	435000	16,500.00	147972	16,500.00	1	0.00	0.00	0.00	0.00
71	04917	1997 SPONSORSHIP FEE	01/02/02	435000	33,500.00	207130	33,500.00	1	0.00	0.00	0.00	0.00
72	04976	8635	05/14/00	630000	75.34	108102	75.34	1	0.00	0.00	0.00	0.00
73	05055	CORRECT V#0109290E	01/26/00	610000	(3,421.00)	INTERC	(3,421.00)	1	0.00	0.00	0.00	0.00
74	05055	LABOR & MATERIAL	04/05/01	410000	1,933.33	160197	3,866.66	2	0.00	0.00	0.00	0.00
75	05055	LABOR & MATERIAL	04/05/01	910000	1,933.33	160197	3,866.66	2	0.00	0.00	0.00	0.00
76	05055	ROOF PAINTING	04/23/02	610000	1,460.00	227649	1,460.00	1	0.00	0.00	0.00	0.00
77	05365	99790	04/22/02	730100	76.90	231479	76.90	1	0.00	0.00	0.00	0.00
78	05475	0007113	02/03/02	530013	129.60	214692	129.60	1	0.00	0.00	0.00	0.00
79	05585	99836	02/20/03	330200	172.42	279836	172.42	1	0.00	0.00	0.00	0.00
80	05616	1996 DUES	11/28/00	460200	224.70	139281	224.70	1	0.00	0.00	0.00	0.00
81	05652	T53052960SN	11/21/01	935050	143.82	202686	143.82	1	0.00	0.00	0.00	0.00
82	06587	N13271	01/12/03	530100	1,284.06	272615	1,284.06	1	0.00	0.00	0.00	0.00
83	06587	N13413	01/29/03	530100	2,574.24	275105	2,574.24	1	0.00	0.00	0.00	0.00
84	06587	R02103	08/26/02	510500	866.00	253542	866.00	1	0.00	0.00	0.00	0.00
85	06711	25739671	03/23/03	330700	1,669.15	284353	1,669.15	1	0.00	0.00	0.00	0.00
86	06711	23764329	11/04/02	330700	2,242.07	271539	2,242.07	1	0.00	0.00	0.00	0.00
87	06742	249005	05/03/02	630620	43.28	232195	43.28	1	2.60	0.97	0.00	0.00 Tax due on transaction
88	07214		06/29/00	436600	105.40	118157	158.10	2	0.00	0.00	0.00	0.00
89	07214		06/29/00	436600	52.70	118157	158.10	2	0.00	0.00	0.00	0.00
90	07214		07/28/00	436600	263.50	140235	790.50	3	0.00	0.00	0.00	0.00
91	07214		07/28/00	436600	263.50	148405	790.50	3	0.00	0.00	0.00	0.00

Statistical Sampling for Sales and Use Tax Audits

92	07214		07/28/00	436600	263.50	123249	790.50	3	0.00	0.00	0.00	0.00
93	07214	JULY STATEMENT	08/02/01	436600	1,923.25	181091	1,923.25	1	0.00	0.00	0.00	0.00
94	07214	902682, 902787	10/11/01	461402	274.75	197506	659.40	2	0.00	0.00	0.00	0.00
95	07214	902682, 902787	10/11/01	461404	384.65	197506	659.40	2	0.00	0.00	0.00	0.00
96	07214	902664	10/14/01	461403	494.55	196133	494.55	1	0.00	0.00	0.00	0.00
97	07214	PAID TWICE 197825	11/11/01	436600	(274.75)	199320	(274.75)	1	0.00	0.00	0.00	0.00

Statistical Sampling for Sales and Use Tax Audits

It is important to ensure that the data file provided by a taxpayer has sufficient detail to enable the auditors to identify and retrieve individual transaction. Additional information, such as item descriptions and tax paid or accrued is useful for the auditor in making tax determinations directly from the electronic data. This can be a tremendous time saver for both the taxpayer and auditor.

Data for sales data analysis

Request is not limited to the following fields nor will all the following fields apply to each audit – determination of exact fields is dependent on the file descriptions provided by the taxpayer. All fields captured are required, but there are minimal fields that must be available to sample. Those fields of information are in bold type below.

Data Element	Data Element Definition
Customer Name	Name of customer making purchase
Customer Number	Unique number assigned to a customer
Customer State	Customer's billing address.
Customer Zip Code	Customer's billing address
Ship-to State	Customer's ship-to address
Ship-to Zip Code	Customer's ship-to address
Invoice Number	Control number on an invoice assigned by the taxpayer
Invoice Date	The date they taxpayer created the invoice
DLN	Document locator number needed to find transaction on document retrieval system
Purchase Order Number	Serial number on the purchase order sent by a customer
Purchase Order Description	Description on purchase order of goods/services ordered
Batch Number	Number assigned to a group of invoices for processing

Statistical Sampling for Sales and Use Tax Audits

Product Number	Bar code number which identifies the product
Product Description	Description of goods being sold
Job number/Work order number	Unique number assigned to a job
Job Description	Description of services performed
Invoice Amount	Total amount of sales to customer
Cash Discount	Price reduction given by taxpayer
Shipping and handling	Amount on invoice for transportation costs
Invoice Tax Amount	Amount on invoice indicating sales tax on goods/services
Line Amount	Amount of sales for each line item on invoice
Line Tax Amount	Amount of sales tax for each line item on invoice
Tax Rate	Actual tax rate charged or coded
Single Article Indicator	Code to identity single items that are over the maximum amount taxable for local sales tax rates
Taxability Code	Code to identify exempt items/customers
Tennessee Tax Exempt Certificate Number	Sales tax exempt certificate provided to the taxpayer by the customer to waive sales tax charged to the customer
FOB terms	Shipping terms agreed on between taxpayer and customer
Location Code	Taxpayer's location/store number that goods/services were sold from
Ship from Address	Taxpayer's location/store address that goods/services were sold from

Statistical Sampling for Sales and Use Tax Audits

Data for accounts payable/expense and asset data analysis

Request is not limited to the following fields nor will all the following fields apply to each audit – determination of exact fields is dependent on the file descriptions provided by the taxpayer. All fields captured are required, but there are minimal fields that must be available to sample. Those fields of information are in bold type below.

Data Element	Data Element Definition
Vendor Name	Name of vendor providing the services, supplies, or materials associated with a given invoice
Vendor Number	A unique number assigned to represent a vendor
Invoice Number	Control number assigned to the invoice assigned by the supplier
Transaction Number	A number to identify a unique transaction such as a journal entry, reversing entry, closing entry, adjusting entry, reclassification entry, etc.
DLN	Document locator number needed to find transaction on document retrieval system
Invoice Date	The date on the purchase invoice from the vendor
Transaction Date	The date a transaction was put on the system
Invoice Amount	The total amount of the invoice
Transaction Amount	The total amount of the transaction
Shipping & Handling	The amount on the invoice representing the cost incurred to handle and transport/deliver the goods
Tax Paid Amount	An amount on the invoice depicting the tax charged and paid on the goods and /or services purchased
Tax Accrued	Value of entry made in taxpayer's records depicting the tax due the department
Account Charged	Identifies the account(s) to which the cost of the goods and/or services are being distributed (i.e. from a chart of accounts)

Statistical Sampling for Sales and Use Tax Audits

Cost Center   Identifies where the costs of the goods and/or services have been/should be distributed

Department   The department from which the purchase was made or in which a job the goods and/or services were performed

Job number/work order number   A unique number assigned to the "job" number for which the materials and/or services are being used

Job description   A description of the job for which the materials and/or services are being used

Batch Number   A unique control number that has been assigned to a group of invoices in preparation of the data being keyed into a computer

Location   Identifies the location where goods or services were used

Check Number   The unique control number that is generally "press numbered" onto all checks

Voucher Number   A control number attached to a voucher that is assigned by the purchaser

Purchase Order Number   A serial number printed on the purchase order sent by the purchasing department of a business

Purchase Order Description   A purchase order description of the goods or services desired

Distribution Amount   Detail line amount distributed to the G/L account

Product Description   The invoice description of the goods being purchased or services being provided